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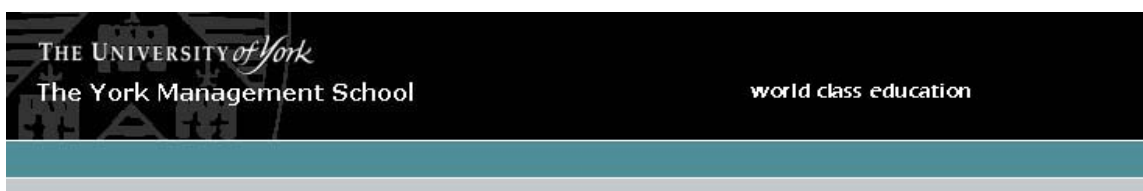
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**WHO INVESTS TOO MUCH IN EMPLOYER STOCK, AND WHY
DO THEY DO IT? SOME EVIDENCE FROM UK STOCK
OWNERSHIP PLANS**

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**This paper is circulated for discussion purposes only and its contents should be
considered preliminary.**

Andrew Pendleton is Professor of Human Resource Management in the Department of Management Studies, University of York, UK. The research was financed and data collection organised by the UK stock ownership lobby group Proshare, Abbey National PLC, and Halifax PLC. My collaboration in the project was assisted by the Inland Revenue. Responsibility for the interpretation of results rests with the author, and does not necessarily reflect the views of the sponsoring bodies.

WHO INVESTS TOO MUCH IN EMPLOYER STOCK, AND WHY DO THEY DO IT? SOME EVIDENCE FROM UK STOCK OWNERSHIP PLANS

ABSTRACT

Using data from a survey of employee stock-owners in seven UK companies, the author examines the determinants of excessive ownership of company stock in savings portfolios. The paper draws on the insights from the recent 401 (k) literature and examines the role of attitudes as well as demographic characteristics. By using a survey of employees it is possible to investigate the role of these factors more precisely than in much of the 401 (k) literature. The results indicate that loyalty and familiarity are important determinants of concentration in employer stock. Income is important too: the results imply that as savings rise with income, familiarity especially leads employees to channel much of this into employer stock.

Why do some employees invest heavily in employer stock when prudent investment principles suggest that they should not? This has become a major issue in the context of US 401 (k) pension plans, and has been given sharp relief by the events at Enron and other corporate scandals. In the last ten years a fairly substantial literature has developed in behavioral finance examining the factors that lead employees to invest, and invest substantially, in employer stock when presented with a choice of investment alternatives in their pension plan. This literature has highlighted the role of plan design and irrational behavior of participating employees. By contrast, the industrial relations literature on employee stock ownership plans has barely considered the issue of portfolio concentration despite the obvious dangers that company stock plans will encourage employees to make poor investment choices. This literature has tended to assume that stock ownership plans are a good thing if there are favorable impacts on corporate performance, and this judgment has been made without reference to the potential costs borne by employees.

This paper extends the analysis of portfolio concentration found in 401 (k) plans to employee stock ownership plans, drawing on data from a stock acquisition plan in the UK. The reasoning is that in countries outside the US, where defined contribution pension plans are much less widespread, employee stock ownership plans tend to be the main means by which employees acquire company stock. Although stock ownership plans tend not to contribute to future pension income in the way that 401 (k) plans do, they can nevertheless be a very important investment. On average, employees contribute between 5 and 7 per cent of their annual income to the stock plan in our study, with higher proportions in evidence amongst lower income employees. These levels are similar to the proportion of salaries that are typically

paid into company pension plans in the UK. In the case of stock ownership plans, the issue of inadequate diversification relates to the role of company stock in employees' overall savings and investment portfolios.

The paper addresses a number of questions. Who tends to overweight in employer stock? Do certain types or groups of employees concentrate their investments more than others? What are the determinants of portfolio concentration? The paper takes a novel approach in that it examines the determinants of over-weighting by collecting information directly from employees rather than from company filings or plan administrators. It can therefore examine directly the role of employee attitudes and preferences, instead of basing attitudinal and behavioral explanations on macro-patterns in plan assets (as is the case in much of the 401 (k) literature). We assess the role of loyalty and familiarity, both of which are important explanatory factors in the literature (Benartzi 2001; Cohen 2004; Huberman 2001). Although data is obtained from the rather different regulatory and savings context of the UK, the results are broadly consistent with those in the US pensions literature. We also present disturbing evidence at the end of the paper that overweight employees are continuing to pour income into the stock plan, that many of the most overweight employees have no other equity-based investments, and that overweight employees are no more likely to monitor their company-based investments than other employees.

1. Portfolio choice

Employee stock ownership plans, supported by tax concessions, are obviously designed to encourage employees to acquire company stock. Where stock is granted

free to employees, and in addition to wages, this does not seem to pose major problems. But where employees are invited to subscribe to company stock, there is the possibility that employees will invest too much, thereby exposing themselves to unnecessary risk. To date, we lack information on this issue but there is a clear message from the 401 (k) literature: given the opportunity, many employees will invest far too much in company stock. Mitchell and Utkus have estimated that nearly a quarter of 401(k) participants with the opportunity to invest in company stock have in excess of 60 per cent of their plan assets in employer stock (2003). Other studies have found similar results: Liang and Weisbenner (2002) find that the average share of company stock in participants' discretionary contributions is nearly 20 per cent, whilst Benartzi and Thaler (2001) found that over 40 per cent of the assets of 67 funds are invested in company stock. The potential consequences of over-concentration in employer stock have been graphically illustrated by recent corporate scandals and collapses. Over half (62 per cent) of the assets in the Enron 401 (k) plan were invested in Enron stock. Even without the risks of collapse, portfolio concentration is a costly investment strategy since most employees will secure better returns by investing in a diversified portfolio (Meulbrock 2005).

Given these costs and risks, the reasons for over-concentration in employer stock are clearly of interest. The literature on 401 (k) plans has identified two sets of inter-related factors: plan design and irrational employee behavior. Plan design issues include the inclusion of company stock in the range of asset classes, and the common practice, particularly in larger firms, of employers matching employee contributions with company stock. Both may be interpreted as 'implicit investment advice' (Liang and Weisbenner 2002). Huberman and Sengmueller find that participants amplify

matching contributions made in company stock with higher voluntary company stock contributions (2004: 433). The number of asset classes on offer may also affect the extent of employee concentration especially as employees often make ‘naïve allocation choices’, such as dividing their contributions equally between asset types (Benartzi and Thaler 2001; Liang and Weisbenner 2002), possibly as a way of simplifying the decision set (Madrian and Shea 2001).

Employee attitudes and behavior are clearly central to portfolio concentration, whatever the contours set by plan design, and the literature has identified several salient characteristics and processes. A widespread explanation focuses on procrastination and inertia (Madrian and Shea 2001; Agnew et al 2001). Employees put off making investment decisions, possibly because they are too difficult or boring. Where plan design features encourage acquisition of employer stock, inertia and procrastination will mean that employees fail to sufficiently re-balance their investment portfolios. The evidence on trading behavior is certainly supportive of this: most employees do not actively trade any component of their 401 (k) portfolios (Mitchell et al 2005; Agnew et al 2001), and employees tend not to take the opportunities provided by plan rules to diversify at certain age and tenure thresholds (Choi et al 2005)ⁱ.

Another explanation focuses on the tendency of employees to base investment decisions on past returns rather than likely future returns (Huberman and Sengmueller 2004; Benartzi 2001; Sengmueller 2001). Huberman and Sengmueller find that good current stock performance is associated with increased flows into company stock whilst bad performance does not lead to transfers out. The lack of association

between investment choices and future returns also indicates that insider information does not influence stock purchases (Benartzi 2001; Huberman and Sengmueller 2004; Cohen 2004).

A further explanation highlights the role of ‘familiarity’: it is argued that employees like to invest in the familiar, reflecting a broader and more fundamental human tendency to go with what we know best (Huberman 2001). There is some limited empirical support for this: the presence of a company stock in a 401 (k) plan increases participation rates, especially amongst low-income employees (Huberman 2003). However, it is difficult to test familiarity, especially with the data sources that are commonly used (company level data and plan administrator records). Survey methods seem more appropriate but even then there are design issues. Benartzi asked employees to assess their degree of familiarity with their company. Although the results are not presented in detail in the paper, such an approach seems likely to generated skewed responses. However, he found that familiarity so measured was not a significant predictor of portfolio concentration (2001: 1095).

Loyalty might also explain investment in employer stock. Those with greater organizational commitment may be more likely to invest, and to invest more (Mitchell and Utkus 2003; Cohen 2004). There are two aspects here: more committed employees may get utility from expressing their commitment in stock purchases, and may perceive the value of employer stock and company prospects more favorably than others (Cohen 2004). Yet the evidence for a commitment effect is not strong. Although Cohen finds a commitment effect, this is observed indirectly by comparing portfolio behavior of employees in single division firms with those in conglomerates.

The key assumption is that employees in single division firms will be more committed to the firm. He also uses union membership as a proxy for low commitment. Those familiar with the dual commitment literature might find this a somewhat questionable approach (Angle and Perry 1986). Benartzi, by contrast, measures commitment directly, using the Mowday et al Organisational Commitment Scale in an employee survey, but fails to find a commitment effect (2001). This might be because the sample is mainly composed of middle-aged, high income white males: it is possible that there is less variance in the commitment scores than would be found in a more diverse sample.

Overall, the recent literature on 401 (k) plans has generated fascinating insights into how and why employees acquire too much employer stock. Its main limitation, however, is the limited direct information on those doing the behaving! Many studies of portfolio allocations and concentration in employee stock use company 11-K reports filed to the SEC (eg Huberman and Sengmueller 2004; Liang and Weisbenner 2002) or Form 5500 filed with the IRS and Department of Labor (eg Meulbroeck 2005). Whilst these data are useful for comparing plan design and practices between companiesⁱⁱ, they do not contain information on individual choices (or their determinants). The behavioral explanations identified in this literature are therefore often imputed from firm-level phenomena. Other studies of 401 (k) plans use administrative records maintained by plan providers though these have been seldom used for investigating portfolio concentration (an exception is Choi et al 2004). These records have been useful for exploring the role of demographic factors in participation in 401 (k) plans but they are limited by the absence of those attitudinal and behavioral

characteristics (other than the revealed preference of investment choice) which are thought to influence investment practices.

There is an argument, then, for alternative sources of data. We use an employee survey to collect information on demographic and attitudinal characteristics. Use of a survey also counteracts another important limitation of administrative and disclosure data: insufficient information on employees' total investment portfolios (Poterba 2003; Mitchell and Utkus 2003). Studies of 401 (k) plans based on regulatory filings or administrators' records can typically only assess holdings of employer stock against other investments within the plan, whereas an employee survey can assess portfolio concentration within total savings.

2. Predictions

The key objective of the research is to evaluate the demographic and attitudinal determinants of portfolio concentration amongst employees in employer stock ownership plans. The rationale for focusing on company stock plans is that these are the main means by which employees acquire stock in their employer in countries outside the US. As noted earlier, it is possible for employees to put substantial portions of their income into stock plans with the clear dangers that this poses in terms of risk exposure. The rest of this section generates a set of predictions, based on the 401 (k) and equity investment literatures, and gives further information about the proxies and variables used in the analysis.

Demographic factors

Age. The likelihood of owning stock (Amerik and Zeldes 2001), and participating in employer stock plans, rise with age (Pendleton 2006) (though declining somewhat in the run-up to retirement). However, portfolio concentration might be expected to decline by age somewhat on the grounds that knowledge of personal finance will improve with age. Also, there is some evidence that stock trading is more prevalent amongst older employees (Mitchell et al 2005) and thus older workers with concentrations of employer stock may trade out of them to some extent. However, there is also evidence that divestment of company stock does not vary by age (Choi et al 2005) and that portfolio concentration within 401 (k) plans rises with age, though not strongly so (Holden and VanDerhei 2001)ⁱⁱⁱ. Given this evidence, we predict that portfolio concentration will rise with age. In the survey age is recorded using a five-category ordinal question, and converted into four dummies for the statistical analysis.

Income. On the basis that income will proxy for education and ability, portfolio concentration should be inversely related to income. As above, the greater propensity to trade amongst high earners observed in some studies might mitigate somewhat the observed influence of income on propensity to save, to purchase equities (Agnew et al 2001), and to invest in employer stock (Pendleton 2006). However, other studies (eg Choi et al 2005) find that divestment of company stock is not influenced by income levels (2005), and this might lead to concentration over time. On this basis, we predict that concentration will rise with income. The survey records income with an eight- category question: these categories are collapsed into four in the analysis (three dummies).

Sex. Much of the evidence to date indicates that females are less likely to invest in equities (Agnew et al 2003) though more likely to participate in savings plans and accumulate savings (Huberman et al 2003)^{iv}. Gender differences in investment behavior are typically attributed to variations in risk-aversion (Agnew et al 2003) or ‘over-confidence’ amongst men (Barber and Odean 2001). It is predicted therefore that women will be less likely to concentrate their savings and investments in employer stock.

Attitudinal predictions

Organisational commitment. Those who are more committed to the company may have a greater propensity to hold higher concentrations of employer stock as an expression of their loyalty and as an outcome of over-favourable perceptions of company prospects (Cohen 2004). To assess this, employees were asked five of the positively-worded five-point items from the British Organizational Commitment scale (Cook and Wall 1980). These were combined into a single commitment scale (Alpha = 0.8063).

Risk aversion. Risk preferences are seen as a key determinant in much of the literature but, with a few exceptions (eg Sunden and Surette 1998), are rarely measured directly. Instead risk aversion is viewed as a revealed preference. Here we have a direct five-point measure of risk preference (‘share ownership is only worthwhile if there is no risk involved’). We predict that those with lower risk aversion will more likely hold a concentrated position in employer stock.

Familiarity Following Huberman, concentrated ownership of employee stock is predicted to follow from familiarity: employees prefer to invest in the familiar.

Familiarity is difficult to operationalize empirically since all employees will necessarily be familiar with their employer and the stock plan (all participate in it), though possibly to varying degrees. To capture variations in familiarity we measure the duration of employee participation in the company's stock ownership plans, on the basis that longer participation will reflect greater familiarity. A potential problem with this measure is that the longer the duration of participation, the greater the opportunity to build up holdings in employer stock, all other things being equal. Thus, the measure might pick-up inertia as well as familiarity (i.e. a failure to trade-out of employer stock). However, since participation in savings contracts to purchase employer stock and conversion of these contracts into stock both require positive and explicit formal decisions by employees, the noise in this measure is felt not to be too serious. We use tenure as a measure of familiarity with the employer. A problem with both proxies, though, is that they will inevitably be highly inter-correlated with age, given career employment in all organizations in the study (mean tenure = 12.4 years; S.D = 8.6). Thus, the regression results may be unstable on insertion of familiarity proxies. A further conceptual and measurement issue concerns the nature of familiarity: our measures assume it is a broadly linear phenomenon but it is possible there is a threshold effect after which familiarity grows far more slowly than in an initial period of getting to know the company and/or the stock plan^v.

3. Data

Data were collected from employees in seven large UK companies with Save As You Earn (SAYE) plans in late 1999. The objective of the survey was to collect data on all aspects of employee participation in stock plans, especially SAYE. It was organized

by the financial education lobbying body Proshare, and administered in conjunction with two share plan administrators: Abbey National and Halifax Employee Share Services. Questionnaires were sent randomly to 24, 196 employees in these companies (combined UK employment of 262,320), with 5223 submitting completed and useable returns (response rate = 21.58%). After removing those who have not participated in the plan and/or do not hold any employer stock there are 4073 respondents used in the study.

SAYE is a combined savings and stock option plan, which provides a low-risk method for employees to acquire stock in their employer. It is a well-established and popular set of arrangements: in 2004 700 companies had a live SAYE plan, with options subscribed to by 600,000 employees (Inland Revenue 2005). At the outset participants decide a level of option awards for three or five years hence. They take out a SAYE tax-advantageous savings plan, with regular monthly payments. At the end of the savings period they can either take the lump sum or exercise their SAYE options. In the sample 85% acquired shares at the end of the savings period in their most recent SAYE maturity, with just over half of these retaining the shares for a year or more. Those acquiring shares are liable to capital gains tax when shares are sold, though an annual CGT allowance means that no tax will be paid in most circumstances^{vi}. Employers can offer up to a 20 per cent discount on the prevailing market price at award, and most do (all companies in the study did so). Although SAYE uses an option form it differs from the standard American model whereby stock option grants are awarded by the company as an integral part of remuneration. The SAYE plan can be seen as a discretionary deferred stock purchase plan without downside risk during the 'holding' (vesting) period. The features of SAYE plans are

narrowly prescribed by legislation so there is very little difference between plans in the seven companies. Whilst this entails that we cannot test the influence of plan design, it means that the influence of plan design is controlled for in the research design.

The main dependent variable is the proportion of employee savings and investments that is accounted for by employer stock^{vii}. This is a subjective measure of portfolio concentration, and invites employees to choose four categories of concentration: 1-25%, 26-50%, 51-75%, and 76-100%. The dependent variable is essentially subjective (compared with the detailed financial information found in the behavioral finance literature) but respondents' evaluation of value is important given the focus on employee perceptions and attitudes. Use of categories is not ideal but more precise questioning on this topic can depress response rates and invite inaccurate responses. Benartzi et al (forthcoming) attempted to gain more precise information on concentration but had to use categories as a fall-back position for around a quarter of respondents. A further point to note is that this measure excludes pensions investments and housing: in the UK the predominance of a defined benefit occupational pension system amongst large employers (until very recently) means that most employees draw a sharp distinction between savings and pensions. Neither pension contributions nor pension benefits would be included in individuals' calculations of their savings and investments (except perhaps amongst company directors). All firms in the study had a defined benefit pensions plan at the time. The strength of the concentration measure used here is that it factors in all other employee savings and investments unlike many of the 401 (k) studies, where the focus is assets held just within the plan.

The analytical approach in the remainder of the paper is to identify determinants of portfolio concentration. Prior to presenting regression results, we present descriptive statistics to give a picture of the characteristics of those tending to concentrate in employer stock. Following the regression results we present further results which highlight the significance of the problem of excessive concentration.

4. Results

Table 1 presents information on the proportion of employee shareholders in each portfolio category. 22 per cent of shareholders have 50% or more of their savings and investments held in portfolio stock. This is similar to levels of concentration found within 401 (k) accounts mentioned earlier. It is noticeable that the differences between men and women are negligible, contrary to predictions.

Table 1 about here

Table 2 presents information on the proportion of each age group in each portfolio category. As with sex, the differences between age groups are tiny. Once again this is contrary to the prediction that concentration will rise with age, though consistent with recent findings in Choi et al (2005).

Table 2 about here

Table 3 shows the proportion of each income group in each portfolio category. Here the results are more striking: the likelihood of higher concentration rises with income.

It was expected that those on higher incomes would more likely diversify assuming high levels of education and financial literacy amongst higher earnings. Instead, these results imply that the higher levels of savings associated with higher income (the strongest determinant of contributions to SAYE plans is income, as is true of 401 (k) plans) tend to flow disproportionately into employer stock.

Table 3 about here

In the next stage of the analysis, the results of multiple regression are presented. The determinants of portfolio concentration are evaluated using OLS procedures. The four-category dependent variable is converted to a continuous variable by taking the mid-point of each category. As Stewart points out (1983), this is a somewhat ad hoc procedure, with the unknown distribution of values within each category being the main limitation. An alternative approach is the interval regression procedure in STATA whereby lower bound and upper bound values are created. However, the nature of the categories is such that the lower and upper bound values correlate perfectly so little is to be gained by this procedure. Coefficients and standard errors are very similar though not quite identical to those from OLS, whilst OLS has the advantage of a more precise model fit. OLS is also preferred to an ordered category (e.g. probit) approach as the coefficients are more meaningful, though once again the results are similar (model fit, relative size of coefficients, and significance levels). The approach in the regressions is to test each variable of interest, starting with the demographic variables.

Table 4 about here

Taking the basic demographic model first, the results indicate that the impact of income on portfolio concentration is strongly positive, whilst age and gender have small and insignificant effects (except for Age55+). This is unsurprising given the earlier descriptive statistics. Income is a powerful predictor of the level of savings in employer stock plans: the correlation between the 'raw' income variable and the level of current contributions into SAYE is high ($r = 0.501^{***}$). Thus, as employee contributions to savings grow with income, the implication is that a disproportionate amount goes into employer stock.

The first familiarity model adds tenure to the demographic model. The measure of tenure is positive and significant at 0.001, providing support for a familiarity explanation. On the assumption that tenure proxies familiarity with the employer, the better employees know their employer the more they come to hold concentrations of employer stock. In this model the age dummies become steadily more significant and negative: this is unsurprising given the correlation between age and tenure ($r = 0.473^{***}$). The second model replaces tenure with the duration of participation in SAYE, and proxies familiarity with the stock plan. This variable is a very powerful determinant of concentration in employer stock, and the model fit improves substantially. Inclusion of this measure attenuates the effect of income somewhat but income remains a significant determinant of concentration.

In the commitment model, commitment is a significant determinant of concentration though the magnitude of effects are between half and a quarter of the familiarity proxies. The behavior of other variables is consistent with previous models. Then, in the risk preference model, this proxy is significantly related to concentration. Finally,

all of the models are combined. In this the duration of participation in the employer stock plan and commitment are the strongest non-demographic influences on portfolio concentration, with risk preferences and tenure becoming insignificant. It is noticeable that the income effects are considerably smaller in this model, implying that higher income employees tend to have some combination of familiarity with the stock plan and commitment to the firm.

5. Further analysis

The results from the regressions are suggestive of the idea that those with excessive employer stock tend to be those who have participated in employer stock plans for some time and tend to put disproportionate proportions of additional savings into employer stock as their income increases. The results indicate that familiarity and loyalty influence portfolio concentration. In this final section we examine the nature of portfolio concentration further and assess whether those employees with concentrated positions in employer stock take any steps to mitigate the risks arising from this.

The first column of Table 5 reports the average level of current contributions into the SAYE plan for each portfolio grouping. As can be seen, there is quite a pronounced jump from contribution levels in the group with least concentration to those of the next group. The most concentrated group has the highest levels of current contributions. Although it is possible that participants may not exercise the options or may sell stock at or near option exercise, and therefore not add to portfolio concentration, earlier behavior and evidence elsewhere (see Pendleton 2005) suggests

that most will exercise and retain stock. Thus, there is circumstantial evidence that employees are adding to their portfolio problem.

Table 5 about here

Column 2 of Table 5 presents results on the extent to which employees hold additional equity-based investments. In the survey employees were asked if they held stock in other companies or in mutual funds. A number of routes were identified for acquiring other stock (stock purchases, stock purchases in privatization initiatives etc). An index was created (0-5) for the number of these alternative stock-based investments. As can be seen in Table 5, the most concentrated group is notable for the lowest average number of alternative investments. This implies not merely that a disproportionate amount of investment is held in employer stock but that for many employees their holdings of employer stock are their only stock-based investments. 50 per cent of the most concentrated group has no other stock-based investments, and a further 31 per cent have just one. The most common form of stock is that awarded to building society customers when building societies converted from mutual ownership to public limited company status. Overall, portfolio concentration is clearly not about incorrect balancing of a diversified portfolio but the absence of any diversification at all in many cases and very limited and inactive balancing in others^{viii}.

Finally, we examine the extent to which employees with concentrated portfolios monitor their investments in company stock. The expectation is that employees with more concentrated portfolios will monitor company performance to a greater extent

than others because of their exposure to risk. Table 6 presents descriptive results for two questions in the survey relating to monitoring.

Table 6 about here

It is noticeable that the distribution of answers between the portfolio categories to the question on stock price monitoring is very similar. This finding is reinforced by the results for engagement with company information: those with concentrated portfolios are not more likely than other groups to read information about the company.

Overall, these results add to anxieties about the dangers of excessive ownership of company stock: those with concentrated positions do not appear to be more concerned about their investment than other employees.

6. Conclusion

The main conclusion of the study is that employee behavior in employee stock ownership plans is similar to that observed in 401 (k) pension plans. There is a sizeable proportion of employee stock-holders who appear to hold too much company stock. Some of the behavioral influences identified in the pensions literature – loyalty and familiarity – do influence levels of portfolio concentration. The results suggest that, in the presence of employee stock ownership plans, increased savings arising from income increases tend to flow disproportionately into stock ownership for those employees with greatest loyalty and familiarity. As well as extending the analysis of pension plans to stock ownership plans, the paper makes a contribution by using a large-scale employee survey (the largest in the area as far as is known by the author)

so that employee-level phenomenon can be discerned more clearly than where company-level and plan administrator records are the data source.

The results in the paper clearly add to our anxieties about poor risk management amongst employees. This poses a number of challenges: whilst allocation between asset classes could be controlled by regulation in 401 (k) plans, as is suggested by Poterba (2003) and Benartzi et al (forthcoming), it is less clear how this might be done in stand-alone stock ownership plans. One possibility might be to limit the amount that employees can subscribe to stock plans but there is the danger that this might depress the overall level of employee savings. Certainly there is no evidence in this study that employees will readily invest in alternative stocks (contrary to one of the policy justifications for employer stock plans). Another possibility is greater financial education. However, the evidence suggests that 'passive' financial education is insufficient to change behavior in this area (Choi et al 2005). More active financial advice would seem to be needed, though without contravening regulations on financial services. This might be a role for trade unions.

References

- Agnew, Julie. Pierluigi Balduzzi and Annika Sunden. 2003. "Portfolio Choice and Trading in a Large 401 (k) plan." *American Economic Review* Vol.93, No. 1, pp. 193-215.
- Angle, Harold and James Perry. 1986. "Dual Commitment and Labor-Management Relationship Climates" *Academy of Management Journal*, vol. 29, No. 1, pp. 31-50.
- Barber, Brad and Terrance Odean. 2001. "Boys will be Boys: Gender, Overconfidence, and Common Stock Investment." *Quarterly Journal of Economics*, Vol. 116, No. 1, pp. 261-292.
- Benartzi, Shlomo. 2001. "Excessive Extrapolation and the Allocation of 401 (k) Accounts to Company stock." *Journal of Finance* Vol. 56, No. 5, pp. 1747-1764.
- Benartzi, Shlomo, Richard Thaler, Stephen Utkus, and Cass Sunstein. forthcoming "Company Stock, Market Rationality, and Legal Reform" *Journal of Law and Economics*
- Benartzi, Shlomo. and Richard. Thaler. 2001. "Naive Diversification Strategies in Retirement Savings Plans." *American Economic Review* Vol. 91, No. 1, pp. 79-98.
- Bertaut, Carol and Martha Starr-McCluer. 2000. *Household Portfolios in the United States*. Washington DC: Federal Reserve Board of Governors.
- Brown, Jeffrey, Nellie Liang, and Scott Weisbenner. 2006. "401 (k) Matching Contributions in Company Stock: Costs and Benefits for Firms and Workers." *Journal of Public Economics*, Vol. 90, No. 6/7, pp. 1315-1346.
- Choi, James, David Laibson, Brigitte Madrian and Andrew Metrick. 2001. "Defined Contribution Pensions: Plan Rules, Participant Decisions, and the Path of Least Resistance." In James Poterba, ed., *Tax Policy and the Economy*. Boston: MIT Press, pp. 67-113.
- Choi, James, David Laibson, and Brigitte Madrian. 2005. Are Empowerment and Education Enough? Underdiversification in 401 (k) plans. *Brookings Papers on Economic Activity*, No. 2, pp.151-198.
- Cohen, Lauren. 2004. "Loyalty-based Portfolio Choice". Paper presented to European Finance Association, Maastricht. Paper number 5062.
- Cook, John and Toby Wall. 1980. "New Work Attitude Measures of Trust, Organisational Commitment, and Personal Need Fulfillment". *Journal of Occupational Psychology*, Vol. 53, pp. 39-52.
- Holden, Sarah and Jack VanDerhei. 2001. "401 (k) Plan Asset Allocation, Account Balances, and Loan Activity in 2000". Washington DC: Employee Benefit Research Institute, Brief 239.

Huberman, Gur. 2001. "Familiarity Breeds Investment." *Review of Financial Studies* Vol. 14, No. 3, pp. 659-680.

Huberman, Gur, Sheena Iyengar and Wei Jiang. 2003. "Defined Contribution Pension Plans: Determinants of Participation and Contribution Rates". Pensions Institute Discussion Papers, Pensions Institute, Birkbeck College.

Huberman, Gur and Paul Sengmueller. 2004. "Performance and Employer Stock in 401 (k) Plans." *Review of Finance* Vol. 8, pp. 403-443.

Liang, Nellie and Scott Weisbenner. 2002. "Investor Behavior and the Purchase of Company Stock in 401 (k) Plans - the Importance of Plan Design". Board of Governors of the Federal Reserve System.

Madrian, Brigitte and Dennis Shea. 2001. "The Power of Suggestion: Inertia in 401 (k) Participation and Savings Behavior." *Quarterly Journal of Economics* Vol. 116, No. 4, pp. 1149-1187.

Meulbroek, Lisa. 2005. "Company Stock in Pension Plans: How Costly is it?" *Journal of Law and Economics*, Vol. 48, No. 2, pp. 443-474.

Mitchell, Olivia and Stephen Utkus. 2003. "The Role of Company Stock in Defined Contribution Plans." In Olivia Mitchell and Kent Smetters, eds., *The Pension Challenge: Risk Transfers and Retirement Income Security*. Philadelphia: University of Pennsylvania Press.

Munnell, Alicia, Annika Sunden, and Catherine Taylor. 2000. "What Determines 401 (k) Participation and Contributions?" CRR Working Papers, Center for Retirement Research at Boston College. WP 2000-12

Ofek, Eli and David Yermack. 1996. "Taking Stock: Equity-based Compensation and the Evolution of Managerial Ownership" *Journal of Finance*, Vol. 55, pp.367-1384.

Papke, Leslie 1995. "Participation in and Contributions to 401 (k) Pension Plans: Evidence from Plan Data." *Journal of Human Resources*, Vol. 30, No.2, pp. 311-325.

Papke, Leslie. 2004. "Choice and Other Determinants of Employee Contributions to Defined Contribution Plans." CRR Working Papers, Center for Retirement Research at Boston College.

Pendleton, Andrew. 2006. "Sellers or Keepers? Stock Retentions in Stock Option Plans" *Human Resource Management* Vol. 44, No. 3, pp. 319-336.

Pendleton, Andrew. 2006. "Determinants of Participation and Contributions to Save As You Earn Stock Option Plans" Unpublished paper.

Poterba, James 2003. "Employer Stock and 401 (k) Plans" *American Economic Review* Vol. 93, No. 3, pp. 398-404.

Stewart, Mark. 1983. "On Least Squares Estimation when the Dependent Variable is Grouped." *Review of Economic Studies* Vol. 50, pp. 737-753.

Sunden, Annika and B. Surette 1998. "Gender Differences in the Allocation of Assets in Retirement Savings Plans." *American Economic Review* Vol. 88, No. 2, pp. 207-211.

Table 1 The distribution of portfolio concentration
% in each portfolio category

	All	Female	Male
1-25%	58	60	57
26-50%	19	18	20
51-75%	11	11	12
76-100%	11	11	11
<i>N</i>	4073	2072	1948

Table 2 Breakdown of portfolio concentration by age of employee

% of each age group in each portfolio concentration category

	16-24	25-34	35-44	45-54	55+
1-25%	58	60	58	59	57
26-50%	19	19	19	18	19
51-75%	11	11	11	12	12
76-100%	11	11	12	12	12
<i>N</i>	262	1034	1357	1105	331

Table 3 Breakdown of portfolio concentration by income of employee

% of each income group (£'000) in each portfolio concentration category

	1 - 9.9k	10 - 19.9k	20 - 29.9k	30k+
1-25%	68	61	55	50
26-50%	16	18	20	23
51-75%	8	11	12	14
76-100%	9	10	13	13
<i>N</i>	743	1332	1158	788

Table 4 Determinants of portfolio concentration

OLS: betas and t-ratios

Variables	Demographic model	Familiarity model 1	Familiarity model 2	Commitment model	Risk preferences model	Combined model
Age 26-34	0.020 (0.60)	-0.000 (-0.01)	-0.057 (-1.77)	0.015 (0.46)	0.016 (0.48)	-0.071 (-2.14*)
Age 35-44	-0.025 (-0.72)	-0.074 (-2.11*)	-0.136 (-3.90***)	-0.027 (-0.76)	-0.028 (-0.80)	-0.152 (-4.28***)
Age 45-54	-0.029 (-0.87)	-0.110 (-3.14**)	-0.165 (-4.84***)	-0.041 (-1.22)	-0.039 (-1.16)	-0.197 (-5.59***)
Age 55+	-0.052 (-2.16*)	-0.107 (-4.27***)	-0.140 (-5.78***)	-0.061 (-2.51*)	-0.059 (-2.43*)	-0.163 (-6.53***)
Salary 10-19.9k	0.071 (3.13**)	0.054 (2.35*)	0.027 (1.21)	0.071 (3.04**)	0.069 (2.99**)	0.023 (1.01)
Salary 20-29.9k	0.135 (5.45***)	0.104 (4.17***)	0.074 (3.03**)	0.128 (5.08***)	0.126 (5.02***)	0.056 (2.23*)
Salary 30k+	0.156 (6.52***)	0.124 (5.10***)	0.085 (3.55***)	0.138 (5.58***)	0.144 (5.82***)	0.053 (2.14*)
Sex	0.013 (0.61)	0.006 (0.32)	0.019 (0.92)	0.016 (0.78)	0.012 (0.56)	0.018 (0.85)
Familiarity: tenure		0.146 (7.42***)				0.036 (1.69)
Familiarity: duration of participation in the stock plan			0.291 (15.32***)			0.279 (13.12***)
Commitment	-	-		0.078 (4.80***)	-	0.082 (5.06***)
Risk preference	-	-		-	0.054 (3.32***)	0.029 (1.80)
Company dummies	Yes	Yes	/yes	Yes	Yes	Yes
N	4020	4020	3997	3914	3936	3863
F	12.32***	15.32***	27.67***	12.80***	12.27***	24.66***
Ajdusted R ²	0.038	0.051	0.091	0.043	0.041	0.099

Notes: * = significant at 0.05; ** = significant at 0.01; *** = significant at 0.001

Table 5 Information on employee investments

Portfolio concentration	Current level of savings in SAYE Mean (SD)	Index of alternative equity investments Mean
1-25%	1074 (873)	1.22
26-50%	1627 (960)	1.35
51-75%	1629 (909)	1.19
76-100%	1672 (946)	0.78
F value	122.9***	24.15***

Notes: significant at 0.001

Table 6 Extent of company monitoring by employee stock-holders

	How often do you check the company's stock price				Too what extent do you read information about the company supplied by the company			
Portfolio concentration category	Everyday	At least once a week	Less than once a week	Never	Always	Most of the time	Some of the time	Never
1-25%	30	31	37	2	43	32	20	5
26-50%	31	36	32	2	44	33	19	4
51-75%	31	35	32	2	47	30	18	5
76-100%	29	35	32	3	44	30	23	4
X ²	27.817*				9.527			

Notes: * = significant at .05

ⁱ There is some limited evidence of re-balancing both in the 401 (k) (Huberman and Sengmueller 2004) and executive compensation literatures (Ofek and Yermack 2000).

ⁱⁱ 11 K forms distinguish between employer and employee contributions, and also indicate whether company contributions are made in company stock

ⁱⁱⁱ Papke (1998) finds that age is negatively, though not significantly, associated with ownership of stocks in retirement portfolios

^{iv} Papke (1998) and Sunden and Surette (1998) show that marital status complicates the influence of gender.

^v We conduct an ad hoc test for this (not reported) by creating a dummy variable where 1 equals employment of three years or more. The results are broadly similar to those reported in the regressions though the coefficients are smaller. In conjunction with the regression results presented, this suggests that there is some kind of threshold affect with familiarity continuing to grow but at a slower rate once the threshold is passed.

^{vi} Taper relief has been introduced since the study was conducted with the CGT liability expiring if shares are held for 4 years or more.

^{vii} Each company operated a defined benefit company pension scheme open to all employees at the time of the survey. At this time employees were not provided with an annual statement of pension benefits nor of total contributions into the plan so they would not have had a meaningful measure of their pension investment. Employees contributing to company defined benefit plans tend not to include pension contributions or benefits in self-assessments of savings ratios.

^{viii} Inclusion of these two measures in the prediction regressions improves model fit considerably (from around 10 % to 15%). However, they are not inserted because of their apparent endogeneity and their lack of direct theoretical contribution to the models, though acquisition of other company's stock could be an indirect measure of familiarity.